



Evaluation of Mature Driver Improvement Program Home-Study Courses

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13. ABSTRACT (Maximum 200 words) This report compares the effectiveness of home-study and in-person courses offered under California's mature driver improvement (MDI) program. The major issue addressed in the report is whether home-study MDI courses are less effective than in-person courses in reducing fatal/injury crashes and total citations. Two secondary issues are (a) the validity of MDI course completion as an indicator of fatal/injury crash risk and (b) whether MDI courses themselves reduced fatal/injury crash risk. The study results provide little evidence that home-study courses are less effective than in-person courses in reducing fatal/injury crashes and total citations, and no evidence that MDI course graduates are at actuarially lower fatal/injury crash risk than are nonparticipants. In addition, the results indicate that the MDI program may have reduced the rate of traffic violation citations, but not the rate of fatal/injury crashes, among course graduates.				
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PREFACE

This report presents findings of an evaluation of the impact of home-study mature driver improvement courses on fatal/injury crashes and total citations. The present report is being issued as an internal monograph of the Department of Motor Vehicles' Research and Development Section rather than as an official report of the State of California. The findings and opinions may therefore not represent the views and policies of the State of California.

ACKNOWLEDGEMENTS

This report presents results of an evaluation of home-study mature driver improvement courses. The study was conducted under the general direction of Raymond C. Peck, Research Chief, and the direct supervision of Robert Hagge, Research Manager. Debbie McKenzie, Staff Services Analyst, formatted the report for publication.

SUMMARY

Background

The California Legislature established the mature driver improvement (MDI) program through enactment of Assembly Bill 2610 (Katz, 1986). This legislation required the Department of Motor Vehicles (DMV) to establish program standards and curricula designed to update the driving skills and knowledge of drivers 55 years of age or older. The MDI course curriculum includes information on defensive driving, traffic laws, and the traffic safety effect of driver fatigue and health, among other topics. MDI course graduates, all of whom have volunteered to take the course, receive certificates of course completion that may qualify them for discounts on their automobile insurance premiums.

Assembly Bill 2610 also required DMV to submit annual reports to the Legislature by July 1 of each year. Subsequent legislation, Assembly Bill 2874 (Epple, 1992), removed the annual reporting requirement. The annual reports were to include information on any differences between the driving records of MDI course graduates and those of drivers with similar characteristics, and on factors that may have influenced course participation.

At present, all MDI courses are instructor-facilitated (in-person courses), with the exception of one home-study course that has been conditionally approved by DMV's Occupational Licensing Section pending an evaluation of its effectiveness.

The primary inferential issue addressed in the present report is whether the home-study course is less effective than in-person courses in reducing traffic fatal/injury crash and citation rates. The comparison of home-study and in-person courses first required that an analysis be conducted to determine whether the home-study and in-person MDI courses reduced traffic fatal/injury crash and citation rates relative to drivers who did not take an MDI course. Additional analyses addressed whether home-study and in-person MDI course graduates were at less

actuarial risk of fatal/injury crashes and citations than were drivers of similar age who did not take an MDI course.

Findings of Prior Studies

Results of the five previous studies comparing driver records of graduates of in-person MDI courses to those of comparison drivers have failed to furnish consistent evidence of either a noncausal (actuarial) or causal relationship between course completion and crash rates. However, MDI course completion was found to be consistently associated with lower rates of total traffic citations, even after statistically adjusting the citation measure to control for certain preexisting differences between MDI and comparison subjects.

Findings of Current Study

The present report includes tabulations and statistical comparisons of demographic and driver-record variables between home-study MDI and in-person course graduates and randomly sampled comparison drivers. The home-study participants consisted of 1,335 drivers who completed the home-study version of an MDI course for the first time between July 1, 1991, and June 30, 1992. The in-person subjects were 35,376 drivers who completed an in-person version of an MDI course for the first time during the same time period. Subjects in the comparison groups consisted of 68,598 randomly selected drivers of the same age who did not complete an MDI course.

Incidents of traffic fatal/injury crashes and citations for each study participant prior to and following treatment group or comparison group assignment were identified from driver records extracted from DMV's automated driver license (DL) masterfile. Comparisons were made on both unadjusted and adjusted subsequent fatal/injury crash and citation rates. Analysis of covariance was used to adjust the subsequent rates for differences in the composition of the study groups on age, sex, license class, prior driver record, and area of residence.

The results of the current study post-course driving record analyses are summarized below.

Home-study MDI graduates vs. comparison group

Unadjusted 18-month subsequent driving record:

- The home-study MDI and comparison groups did not differ significantly on subsequent fatal/injury crash rate.
- Home-study MDI course graduates had a significantly lower subsequent citation rate than did comparison drivers.

Adjusted 18-month subsequent driving record:

- The home-study MDI and control groups did not differ significantly on subsequent overall adjusted fatal/injury crash rate or overall adjusted total citation rate.
- The home-study MDI and control groups did not differ significantly on subsequent adjusted fatal/injury crash rate or subsequent adjusted total citation rate at any combination of age, sex, and number of prior citations.

*In-person MDI graduates vs. comparison group**Unadjusted 18-month subsequent driving record:*

- In-person MDI course graduates had significantly lower rates of subsequent fatal/injury crashes and citations than did comparison drivers.

Adjusted 18-month subsequent driving record:

- The in-person MDI and control groups did not differ significantly on subsequent overall adjusted fatal/injury crash rate. In-person MDI course graduates had a significantly lower subsequent overall adjusted citation rate than did comparison drivers.
- The in-person MDI and control groups did not differ significantly on adjusted subsequent fatal/injury crash rate at any combination of age, sex, and number of prior citations.
- For in-person drivers with no prior citations, the results of the comparisons of adjusted subsequent citation rates depended on age and sex, sometimes favoring the MDI group, sometimes favoring the control group, and sometimes favoring neither group.
- For in-person drivers with one prior citation, adjusted subsequent citation rate was significantly lower for the MDI group than for the control group at every combination of age and sex.

Comparison of Home-Study and In-Person Courses

The relative effectiveness of home-study treatment vs. in-person treatment was evaluated by comparing the two with respect to their "effect sizes," which were determined from the preceding MDI vs. comparison-group comparisons on the covariate-adjusted criterion measures.

- The home-study and in-person programs did not differ significantly on adjusted overall 18-month subsequent fatal/injury crash effect size or overall 18-month subsequent total citation effect size.
- The home-study and in-person programs did not differ significantly on adjusted 18-month subsequent fatal/injury crash effect size at any age.
- The home-study and in-person programs did not differ significantly on adjusted 18-month subsequent total citation effect size for drivers with no prior citations at any combination of age and sex.
- The home-study and in-person programs differed significantly (home-study less effective) on adjusted 18-month subsequent total citation effect size for drivers with one prior citation only for males at ages 60 and 70. Otherwise, the home-study and in-person programs did not differ significantly on this measure.

Conclusions

- The home-study courses were no less effective than the in-person MDI courses in reducing subsequent overall fatal/injury crashes or total citations.

- Neither home-study nor in-person MDI courses appear effective in reducing fatal/injury crashes.
- For drivers with no recent prior citations, neither home-study nor in-person courses appear effective in reducing citations.
- For drivers with recent prior citations, both home-study and in-person courses appear effective in reducing citations.

Recommendation

It is recommended that the department review current mature driver program curriculum guidelines in light of the present study findings. This review should examine the feasibility of allowing the home-study formats to qualify as state-approved mature driver programs.

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INTRODUCTION

Background

Assembly Bill 2610 (Chapter 1325, Katz, 1986 Legislative Session) established a mature driver improvement (MDI) program, which became operative on July 1, 1987. (See Appendix A for the complete text of the bill). The program requirements are detailed in California Vehicle Code (CVC) Sections 1675-77. The intent of the legislation was to encourage drivers aged 55 or older to update their driving-relevant knowledge by completing a driver improvement course. MDI course graduates, all of whom volunteer to take the course, receive a certificate of course completion which they may submit to their insurers to qualify for a reduction in their auto insurance premiums. The amount of the discount is determined by the insurer. An insurer may deny a discount to an individual whose driver record contains certain types of violations or crashes.

MDI courses present information on defensive driving, traffic laws, and the effect on traffic safety of driver fatigue, alcohol/drug use, and health, among other topics. Although the courses are administered by driver improvement schools throughout the State, CVC Section 1675 required the Department of Motor Vehicles (DMV) to develop the curriculum and accreditation procedures for schools desiring to teach an MDI course. DMV was also required by CVC Section 1678 to submit an annual report to the Legislature beginning July 1, 1989, showing the differences, if any, between the cumulative driving records of program graduates and those of a representative comparison group of drivers who did not take the course. Five annual reports have been submitted to the Legislature (Stylos & Janke, 1989; Berube & Hagge, 1990; Foster, 1991; Foster, 1992; Berube, 1994). Subsequent legislation, Assembly Bill 2874 (Epple, 1992), removed the annual reporting requirement. Consequently, the 1993 annual report (Berube, 1994) was the last report submitted. Additional analyses of the MDI program data can be found in Exuzides and Peck (1993) and Janke (1994).

DMV's Occupational Licensing Section conditionally approved a home-study version of an MDI course pending an evaluation of the course's effectiveness. The present report presents results of an evaluation to determine whether home-study MDI courses are any less effective than in-person MDI courses in reducing crash and citation rates.

Summary of Prior Study Findings

Results of the five previous studies comparing records of MDI graduates and comparison drivers have failed to furnish consistent evidence of either an actuarial or causal relationship between course completion and subsequent crash involvement. However, the results did show MDI course completion to be consistently associated with lower unadjusted and adjusted rates of subsequent total traffic citations.

METHODS

Subjects

Three sets of analyses were conducted for the current study. The first set compared the 1,335 MDI course graduates who completed Amundson and Associates' Responsible Driver Course Home-Study Edition MDI course for the first time between July 1, 1991

and June 30, 1992 with those of 68,598 randomly selected comparison drivers who had not taken an MDI course prior to January 1, 1994. (These home-study courses were offered on a statewide basis and at present are the only courses of this type approved by DMV.) These two groups are referred to as home-study participants. The comparison group consisted of subjects in the comparison group used in the 1993 study by Berube (1994), which was obtained by randomly selecting from the department's automated driver record files the records of a 2% sample of licensed drivers aged 55 or older. Any drivers in this comparison group who had ever completed an MDI course were excluded, and the remaining drivers were randomly assigned driver-record reference dates equivalent to the course completion dates for the home-study MDI drivers. The reference date served as the "zero date" for counting driver record entries. The driver records for this set of analyses cover 18 months subsequent to the reference date.

The second set of analyses compared the demographic characteristics and driving records of 35,376 drivers who graduated from an in-person version of an MDI course for the first time between July 1, 1991 and June 30, 1992 with those of 68,480 of the subjects who served as the comparison group for the home-study MDI analysis. (The in-person and home-study comparison groups have slightly different sample sizes due to the unavailability of some driver records at the time of the driver record extracts.) These two groups are referred to as in-person participants. As was the case for the comparison subjects, the MDI graduates were the same MDI subjects used in the 1993 study. An additional 12 months of driver record data accumulated since the 1994 study extended the comparison window for these subjects to 18 months following course completion. The driver records and reference dates for the in-person comparison drivers were obtained by the same procedures as were used for the home-study comparison drivers.

The third set of analyses compared the MDI treatment effects for the home-study participants to those for the in-person participants in order to determine whether home-study treatment was significantly less beneficial than in-person treatment in terms of impact on traffic safety.

Analysis

Actuarial comparisons of MDI graduates and their comparison groups. In order to explore the actuarial validity of giving insurance premium discounts to MDI graduates, supplementary analyses were conducted using actual fatal/injury crash and citation frequencies, without adjusting for demographic and prior-record differences between the groups. In interpreting the results, it is important to understand that an actuarial analysis of risk does not require any assumptions regarding the cause of any obtained difference (here, in subsequent driving records), and is not subject to the same qualifications that are necessary in a cause-effect analysis.

Effectiveness of home-study and in-person courses. Analysis of covariance (ANCOVA) was the primary statistical procedure used for data analysis. This technique enabled the criterion measures (subsequent fatal/injury crashes and citations) to be statistically adjusted in an attempt to equate the treatment groups on the "adjustment variables" (referred to as covariates). Adjusting the criterion measures for group differences on the covariates would be expected to remove some portion of the self-selection bias introduced into the analysis as a result of the voluntary nature of the MDI program.

Potential covariates for inclusion in the statistical models consisted of demographic variables, prior-to-reference-date driver record variables, aggregate census variables, and aggregate driving locality variables. The specific covariates that were considered are listed in Appendix B. The aggregate census variables were identified by DMV as being a parsimonious set of variables for predicting accident risk (DeYoung, 1993). Additional aggregate census variables thought to be related to the driving records of elderly drivers were also included as potential covariates. Only statistically significant variables were included as covariates in the final statistical models.

The driver record covariates represented the 5 months prior to treatment because, at the time of the driver record extraction, only 5 months of prior driver record data were available for many participants due to an earlier purge of driver records by DMV. Preliminary analyses of driver records for in-person participants with complete 3-year prior records indicated that the use of 5-month prior record variables as covariates produced results (statistical adjustments) similar to those produced by using the complete 3-year prior records. Therefore, the use of the 5-month driver record covariates was considered sufficient to adjust for any differences in prior risk level between the treatment and control groups. Total citations included convictions of traffic violations, failures to appear in court or forfeit bail after a citation, and any traffic-citation dismissals following attendance at a traffic violator school or court-approved diversionary program.

Unfortunately, in the present study as in past ones, several important variables were not available as covariates. The most important relate directly to the quantity and quality of driving exposure (e.g., miles driven and traffic density) and to the driver's degree of social responsibility (e.g., attitude, life style, and insurance status). No direct adjustment could be made for these factors. Even if data on these variables had been available, ANCOVA seldom removes all bias from group comparisons, and therefore any causal interpretation of the results must be guarded and tentative.

Prior to comparing the MDI and control groups on the adjusted criterion measures, it was necessary to test for homogeneity of regression of the criterion measures on the covariates within the home-study and in-person cohorts. A violation of homogeneity of regression for any particular covariate indicates that the difference in criterion-measure means for the MDI and comparison groups vary as a function of the magnitude of the offending covariate.

Where significant heterogeneity of regression was detected, ANCOVA equations were used to predict the criterion measures for drivers at various levels of the heterogeneous covariates. The specific values on each covariate for which specific predictions were made were selected *a priori* to reflect the range of values across the majority of study participants (e.g., the selected levels for age were 60, 70, and 80). Familywise alpha inflation for the set of comparisons of adjusted means for each criterion measure was controlled by setting alpha for each pairwise comparison such that the overall probability of finding at least one difference between groups due to chance alone was held at 10%.

Comparison of home-study and in-person courses. In order to compare the relative effectiveness of the home-study and in-person MDI courses, the differences between the MDI and control groups' 18-month subsequent fatal/injury crash and citation rates were expressed as standardized effect size (ES) estimates. For both the home-study and in-person cohorts, one ES estimate was computed for each pair of group means reported in Tables 4, 5, and 6. ES estimates generally range in absolute value from 0.00, indicating no effect of treatment, to about 1.00, indicating a very strong effect of treatment. A minus sign preceding the ES estimate indicates that, based on the magnitude of the difference between the means, the MDI group performed better (had a lower crash or citation mean) than did the control group, and a plus sign preceding the ES estimate indicates the MDI group performed poorer (had a higher crash or citation mean) than did the control group. Using the procedure developed by Rosenthal and Rubin (1982), the differences in the ES estimates between the home-study and in-person participants were tested for statistical significance using one-tailed tests to determine if the home-study course was significantly less effective in reducing fatal/injury crashes or citations than the in-person courses.

RESULTS

Demographics and 5-Month Prior Driving Records

Table 1 presents the demographic profiles of MDI course graduates and comparison drivers for the home-study and in-person cohorts.

Table 1
Number of Subjects (*n*), Percent Men, Percent Holding a
Commercial Driver License, and Mean Age by Group

Group	<i>n</i>	% men	% commercial	Mean age
<u>Home-study</u>				
MDI	1,335	48.5*	0.3**	66.52**
Control	68,598	51.1	1.3	65.49
<u>In-person</u>				
MDI	35,376	39.6**	0.4**	68.80**
Control	68,480	51.1	1.3	65.42

Note. Mean age reflects age on the reference date.

* $p < .10$, two-tailed. ** $p < .001$, two-tailed.

Within each cohort, MDI course graduates tended to be older, female, and less likely to hold a commercial driver's license than were drivers who did not take the course. All of these differences were statistically significant ($p < .10$).

Table 2 presents 5-month prior crash and citation rates (per 100 drivers) for MDI course graduates and comparison drivers in each of the two study cohorts.

Table 2
5-Month Prior Total Crash Rates, Fatal/Injury Crash Rates,
and Total Citation Rates (per 100 Drivers) by Group

Group	Total crashes	Fatal/injury crashes	Total citations
<u>Home-study</u>			
MDI	1.72	0.37	1.95*
Control	1.50	0.39	3.05
<u>In-person</u>			
MDI	1.88**	0.45	2.95
Control	1.51	0.42	3.04

* $p < .05$, two-tailed. ** $p < .001$, two-tailed.

The home-study MDI graduates did not differ significantly from their comparison group on 5-month prior total crashes. However, the in-person MDI graduates had a significantly higher rate of 5-month prior total crashes than did their comparison group ($p < .001$). In both the home-study and in-person cohorts, the MDI graduates did not differ significantly from their comparison group on 5-month prior rates of fatal/injury crashes. In the home-study cohort, the MDI graduates had a significantly lower rate of 5-month prior total citations than did their comparison group ($p < .05$). The in-person MDI group, however, did not differ significantly from its control group on 5-month prior total citations.

Unadjusted 18-Month Subsequent Driving Records (Actuarial Comparisons)

Table 3 presents unadjusted 18-month subsequent fatal/injury crash and citation rates (per 100 drivers) for MDI course graduates and comparison drivers in each of the two study cohorts.

Table 3
Unadjusted 18-Month Subsequent Fatal/Injury Crash Rates
and Total Citation Rates (per 100 Drivers) by Group

Group	Fatal/injury crashes	Total citations
<u>Home-study</u>		
MDI	1.05	7.42**
Control	1.42	9.41
<u>In-person</u>		
MDI	1.25*	6.31***
Control	1.38	9.52

* $p < .10$, two-tailed. ** $p < .05$, two-tailed. *** $p < .001$, two-tailed.

The home-study MDI graduates did not differ significantly from their comparison group on unadjusted subsequent fatal/injury crashes. The in-person MDI graduates, however, had a significantly lower rate than did their comparison group on this measure ($p < .10$). In both cohorts, the MDI graduates had a significantly lower rate of unadjusted subsequent total citations than did the comparison group ($p < .05$ for home-study; $p < .001$ for in-person).

Adjusted 18-Month Subsequent Driving Records

Table 4 presents adjusted 18-month subsequent fatal/injury crash and citation rates (per 100 drivers) for MDI course graduates and comparison drivers in each of the two study cohorts. The adjusted means in Table 4 were computed from the multiple regression model using the combined-group covariate means and within-group regression coefficients. Consequently, the tabled means can be considered as adjusted fatal/injury and citation rates (per 100 drivers) within each group averaged over sex, age, prior driver record, and aggregate census and driving-locality variables.

Table 4

Adjusted 18-Month Subsequent Fatal/Injury Crash Rates and Total Citation Rates (per 100 Drivers) by Group

Group	Fatal/injury crashes	Total citations
<u>Home-study</u>		
MDI	1.02	7.45*
Control	1.42	9.41
<u>In-person</u>		
MDI	1.26	7.07**
Control	1.35	8.79

* $p < .05$, two-tailed. ** $p < .001$, two-tailed.

The home-study and in-person MDI graduates did not differ significantly from their comparison groups on adjusted subsequent fatal/injury crashes ($p > .10$ for both cohorts). On the other hand, the home-study and in-person MDI graduates had significantly lower rates of adjusted subsequent total citations than did their respective comparison groups ($p < .05$ for home-study; $p < .001$ for in-person).

In the analysis of 18-month subsequent fatal/injury crashes, homogeneity of regression was found to be violated for age ($p < .05$). In the analysis of 18-month subsequent citations, homogeneity of regression was found to be violated for sex, age, license class, and prior citations ($p < .05$). Consequently, adjusted 18-month subsequent fatal/injury

crash rates are shown for selected levels of age (60, 70, 80), and adjusted 18-month subsequent citation rates are shown for selected levels of age (60, 70, 80), sex, and prior citations (none and one). Because there were so few drivers with a commercial driver's license, results are shown only for non-commercial drivers. Where heterogeneity of regression was found for a covariate not related to individual drivers (i.e., aggregate-measure covariates), the covariate was set to the average value of the covariate for the MDI and control groups. The analysis of covariance linear equation models for fatal/injury crashes and total citations are shown in Appendix C.

Fatal/injury crashes. Table 5 presents the adjusted 18-month subsequent fatal/injury crash rates for the home-study and in-person MDI and control groups by selected levels of age. Adjusted rates are per 100 drivers. For both the home-study and in-person participants, the differences between the MDI and control groups' rates failed to reach statistical significance for any level of age ($p>.034$).

Table 5

Adjusted 18-Month Subsequent Fatal/Injury Crash Rates
(per 100 Drivers) for the Home-Study and In-Person MDI
and Control Groups by Selected Levels of Age

Group	Age		
	60	70	80
<u>Home-study</u>			
MDI	1.02	1.04	1.07
Control	1.40	1.46	1.51
<u>In-person</u>			
MDI	1.14	1.33	1.53
Control	1.38	1.36	1.34

Note. Each group contrast was conducted using an alpha level of .034 (two-tailed) in order to maintain familywise alpha at .10.

Total citations. Table 6 presents the adjusted 18-month subsequent total citation rates for the home-study and in-person MDI and control groups for the selected levels of sex, age, and number of prior citations. Adjusted rates are per 100 drivers.

Table 6

Adjusted 18-Month Subsequent Total Citation Rates (per 100 Drivers)
for the Home-Study and In-Person MDI and Control Groups
by Selected Levels of Sex, Age, and Number of Prior Citations

Prior citations Group	Women			Men		
	60	70	80	60	70	80
No prior citations						
<u>Home-study</u>						
MDI	5.01	2.67	0.33	12.05	9.70	7.36
Control	7.65	4.18	0.72	14.03	10.56	7.10
<u>In-person</u>						
MDI	6.29*	4.31	2.32*	10.15*	8.17*	6.18
Control	7.47	3.91	0.35	13.87	10.31	6.75
One prior citation						
<u>Home-study</u>						
MDI	10.28	7.94	5.60	17.31	14.97	12.63
Control	21.92	18.45	14.99	28.30	24.83	21.37
<u>In-person</u>						
MDI	11.48*	9.50*	7.51*	15.34*	13.35*	11.37*
Control	21.89	18.33	14.77	28.29	24.73	21.17

Note. Each group contrast was conducted using an alpha level of .009 (two-tailed) in order to maintain familywise alpha at .10. An asterisk indicates a significant difference between groups ($p < .009$).

For home-study participants with no prior citations, the differences in adjusted 18-month subsequent citations between the MDI and control groups were not significantly different at any combination of age and sex. For in-person participants with no prior citations, the MDI group had a significantly lower rate than did the control group for women at age 60 and men at ages 60 and 70, a significantly higher rate for women at age 80, and rates that were not significantly different from those of the comparison group for women at age 70 and men at age 80.

For home-study participants with one prior citation, the differences in adjusted 18-month subsequent citations between the MDI and control groups were not significantly different at any combination of age and sex. For in-person participants with one prior citation, the MDI group had a significantly lower rate than did the control group at all levels of sex and age.

Comparison of Home-Study and In-Person Courses

Table 7 presents the ES estimates for the adjusted 18-month subsequent overall fatal/injury crash rates and total citation rates for the home-study and in-person participants. The effect size estimates shown in Table 7 are computed from the means shown in Table 4 and, therefore, reflect the general effectiveness of the MDI program averaged across all covariates in the statistical models.

Table 7

Standardized Effect-Size Estimates for 18-Month Subsequent Fatal/Injury Crash Rates and Total Citation Rates for Home-Study and In-Person Participants

Group	Fatal/injury crashes	Total citations
Home-study	-0.034	-0.055
In-person	-0.008	-0.056

Note. A minus sign indicates the MDI group had a lower rate than did the control group. Each group contrast was conducted using a one-tailed alpha level of .10.

The home-study and in-person participants did not differ significantly on either overall fatal/injury crash or overall total citation standardized effect size estimates ($p > .10$ for both cohorts).

Fatal/injury crashes. Table 8 presents the ES estimates for the adjusted 18-month subsequent fatal/injury crash rates for the home-study and in-person participants for selected levels of age. The difference in ES estimates for the adjusted 18-month subsequent fatal/injury crash rates between the home-study and in-person participants was not statistically significant ($p > .034$) at any age.

Table 8

Standardized Effect-Size Estimates for 18-Month Subsequent Fatal/Injury Crash Rates by Selected Levels of Age for Home-Study and In-Person Participants

Group	Age		
	60	70	80
Home-study	-0.032	-0.035	-0.037
In-person	-0.021	-0.002	+0.016

Note. A minus sign indicates the MDI group had a lower rate than did the control group, and a plus sign indicates the opposite relationship. All group contrasts were each conducted using an alpha level of .034 (one-tailed) in order to maintain familywise alpha at .10.

Total citations. Table 9 presents the ES estimates for the adjusted 18-month subsequent total citation rates for the home-study and in-person participants at the selected levels of sex, age, and number of prior citations.

Table 9

Standardized Effect-Size Estimates for 18-Month Subsequent Total Citation Rates
by Selected Levels of Sex, Age, and Number of Prior Citations
for Home-Study and In-Person Participants

Prior citations	Women			Men		
Group	60	70	80	60	70	80
<u>No prior citations</u>						
Home-study	-0.080	-0.046	-0.012	-0.060	-0.026	-0.008
In-person	-0.038	+0.013	+0.064	-0.121	-0.070	-0.019
<u>One prior citation</u>						
Home-study	-0.355	-0.320	-0.286	-0.335	-0.300	-0.266
In-person	-0.338	-0.287	-0.236	-0.421*	-0.370*	-0.318

Note. A minus sign indicates the MDI group had a lower rate than did the control group, and a plus sign indicates the opposite relationship. Each group contrast was conducted using an alpha level of .009 (one-tailed) in order to maintain familywise alpha at .10. An asterisk indicates a statistically significant difference between groups ($p < .009$).

For drivers with no prior citations, the differences in ES estimates between the home-study and in-person participants did not reach statistical significance for any combination of sex and age. For drivers with one prior citation, the differences in ES estimates between the home-study and in-person participants were statistically significant ($p < .009$) only for males at ages in the 60-70 range, with the ES estimates for the in-person participants being larger than those for the home-study participants. Among the explanations for this interaction is the possibility that the home-study course is slightly less effective for drivers aged 60-70 who have one prior citation. However, it is also possible that the interaction represents selection bias due to unknown omitted variables.

CONCLUSIONS/RECOMMENDATIONS

The present study found no evidence of a relationship between MDI program participation and subsequent fatal/injury crashes for either the home-study or the in-person courses. However, evidence of significant beneficial effects of the in-person program on subsequent citations was found, although only for drivers with a recent prior citation involvement.

It should be pointed out that a lack of statistical power due to the small sample size for the home-study MDI group may have largely contributed to the nonsignificant effects for this group. This would explain why, for example, the differences between the total citation rates for home-study MDI and control groups were similar in size and direction to those for the in-person groups, and yet still nonsignificant.

The totality of the results suggests that home-study courses appear to be no more or less effective in reducing fatal/injury crashes or citations. Overall, the home-study and in-person courses did not differ significantly on the effect size estimate for either fatal/injury crashes or total citations.

A potential source of bias in the study was the use of prior total crashes as a covariate. The variable was believed to be influenced by under-reporting associated with subject's insurance status. Because a strong motive for taking the MDI course may have been the reduction in insurance premiums, it was expected that MDI participants would be more likely than comparison drivers to hold vehicle insurance and therefore more likely to report their property-damage-only (PDO) crashes, which usually are not reported to DMV by law enforcement. The higher rate of prior total crashes for the in-person MDI group was likely due to this reporting artifact. Despite the potential of bias associated with using prior total crashes as a covariate, it is believed that any such bias would be very small because the relationship of the variable with the criterion measures was the same within each group. Therefore, the adjustment of the criterion measure for this covariate would be constant across the groups and would not have affected the estimate of the program's effectiveness. Because serious crashes are much more likely to be reported by law enforcement, if not by involved drivers themselves, the fatal/injury crash measures were expected to be accurate.

A more serious problem affecting the present study, as well as all previous studies of the MDI program, is that of omitted variables. In any statistical model where predictions are made based on a number of covariates, it is conceivable and even likely that important variables (e.g., amount of driving) are not available as covariates. To the extent that the omitted variables in this study are related both to the self-selection of MDI course attendees into the program and to the outcome (effectiveness) measures, the results of the study may be biased estimates of the relative effectiveness of the two MDI treatments.

Given the current state of knowledge about the MDI program and the lack of access to all relevant variables, it is impossible to gauge the extent to which the problem of omitted variables may have impacted the current study. Therefore, any conclusions regarding the effectiveness of the MDI program, or the superiority of in-person courses over home-study courses, must be considered tentative. This is particularly true for the finding showing the home-study course to be less effective for drivers aged 60-70 who have one prior citation, especially considering the lack of any substantive or compelling rationale to explain such a complex interaction effect. A follow-up study intended to collect survey data on exposure for drivers in the two types of MDI courses is currently being conducted for the purpose of qualifying any results in the present study. (Early results of this follow-up study indicate that home-study MDI graduates drive more miles per year than do in-person MDI graduates, suggesting that the results of the present study may be biased against the home-study format.) Although the present findings cannot be considered definitive for the reasons noted above, the results strongly suggest that the home-study format evaluated in the present study is at least as effective as the standard in-person format in terms of any effects on subsequent driving record.

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APPENDIX A

Assembly Bill No. 2610

CHAPTER 1325

An act to add Section 11628.3 to the Insurance Code, and to add Sections 1673, 1677, and 1678 to the Vehicle Code, relating to vehicles.

[Approved by Governor September 28, 1986, Filed with
Secretary of State September 29, 1986.]

LEGISLATIVE COUNSEL'S DIGEST

AB 2610, Katz. Driver improvement: vehicle insurance.

(1) Under existing law, the Department of Motor Vehicles is authorized to establish standards and develop criteria for driver education programs.

This bill would additionally require the department to establish standards and develop criteria for the approval of a mature driver improvement course specifically designed for the safe driving needs of drivers 55 years of age or older. The course curriculum would include, but not be limited to, specified components. Under other provisions of law, violations of these provisions would be an infraction, thereby imposing a state-mandated local program.

The bill would also provide that drivers who successfully complete the course would receive a certificate provided by the department and awarded by the course provider, which would be suitable evidence of eligibility for reduced motor vehicle liability insurance premiums for 3 years from the date of successful completion of the course. A fee, determined by the department, would be charged each course provider, and each approved course provider would be required to charge each course applicant a fee not to exceed \$20. The bill would require the department to charge a fee not to exceed \$3 for each completion certificate issued. The bill would expressly require the fees received by the department to be deposited in the Motor Vehicle Account in the Transportation Fund pursuant to existing requirements of law.

The bill would also authorize the department to revoke the approval of a course for specified reasons.

The bill would require the department to submit a report, as specified, to the Legislature by July 1 of each year, beginning with July 1, 1989.

(2) Existing law provides that motor vehicle liability insurance rates are regulated so as not to be excessive, inadequate, or unfairly discriminatory in order to promote the public welfare.

This bill would require admitted motor vehicle liability insurers to reduce the premium rates by an appropriate reduction for drivers 55 years of age or older by an amount determined by the insurer based on actuarial and loss experience data, as specified, if the driver can

produce proof of successful completion of a mature driver improvement course. The insured driver would be required to enroll in and successfully complete the course every 3 years to continue to be eligible for the reduced premium. The insurer would be required to reassess the percentage of reduced premium upon renewal of the insured's policy and the insured's eligibility for any percentage of premium reduction would be effective for 3 years. The insured would be disqualified for the reduced premium under specified conditions.

(2) The bill would make legislative findings and declarations.

(3) The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement.

(4) The bill would provide that no reimbursement is required by this act for a specified reason.

(5) The bill would become operative on July 1, 1987.

The people of the State of California do enact as follows:

SECTION 1. The Legislature finds and declares that a driver improvement course specifically designed for the needs of older drivers can be of assistance in increasing the safety of older drivers on the road.

It is therefore the intent of the Legislature to encourage older drivers to update their driving skills and knowledge through a driver improvement course which may be taken every three years, and to offer a reduction in auto insurance premiums upon successful completion of the course.

SEC. 2. Section 11628.3 is added to the Insurance Code, to read: 11628.3 (a) Based on the actuarial and loss experience data available to each insurer, including the driving records of mature driver improvement course graduates, as recorded by the Department of Motor Vehicles, every admitted insurer shall provide for an appropriate percentage of reduction in premium rates for motor vehicle liability insurance for principal operators who are 55 years of age or older and who produce proof of successful completion of the mature driver improvement course provided for and approved by the Department of Motor Vehicles pursuant to Section 1675 of the Vehicle Code.

(b) The insured shall enroll in and successfully complete the course described in subdivision (a) once every three years in order to continue to be eligible for an appropriate percentage of reduced premium.

(c) The percentage of premium reduction required by subdivision (a) shall be reassessed by the insurer upon renewal of the insured's policy. The insured's eligibility for any percentage of premium reduction shall be effective for a three-year period from the date of successful completion of the course described in subdivision (a), except

that the insurer may discontinue the reduced premium rate if the insured is in any case:

(1) Involved in an accident for which the insured is at fault, as determined by the insurer.

(2) Convicted of a violation of Division 11 (commencing with Section 21000) of the Vehicle Code, except Chapter 9 (commencing with Section 22500) of that division, or of a traffic related offense involving alcohol or narcotics.

(d) The percentage of premium rate reduction required by subdivision (a) does not apply in the event the insured enrolls in, and successfully completes, an approved course pursuant to a court order provided for in Section 42005 of the Vehicle Code. Nothing in this subdivision precludes an insured from also enrolling in a driver improvement course.

SEC. 3. Section 1675 is added to the Vehicle Code, to read:

1675. (a) The director shall establish standards and develop criteria for the approval of driver improvement courses specifically designed for the safe driving needs of drivers who are 55 years of age or older which shall be known as the mature driver improvement course.

(b) The curriculum for the course provided for in subdivision (a) shall include, but is not limited to, all of the following components:

(1) How impairment of visual and audio perception affects driving performance and how to compensate for that impairment.

(2) The effects of fatigue, medications, and alcohol on driving performance, when experienced alone or in combination, and precautionary measures to prevent or offset ill effects.

(3) Updates on rules of the road and equipment, including, but not limited to, safety belts and safe and efficient driving techniques under present day road and traffic conditions.

(4) How to plan travel time and select routes for safety and efficiency.

(5) How to make crucial decisions in dangerous, hazardous, and unforeseen situations.

(c) Each mature driver improvement course shall include not less than 400 minutes of instruction, and shall not exceed 25 students per single day of instruction or 30 students per two days of instructions.

(d) Upon satisfactory completion of the mature driver improvement course, participants shall receive and retain a certificate provided by the department, awarded and distributed by the course provider, which shall be suitable evidence of satisfactory course completion, and eligibility for three years, from the date of completion, for the mature driver vehicle liability insurance premium reduction pursuant to Section 11628.3 of the Insurance Code.

(e) The course provider shall report to the department, upon enrollment, the name of each participant and the person's driver's license number. The course provider shall also transmit a copy of each certificate distributed to a participant to the department. These reports shall be used in the evaluation required by Section 1678.

(f) The certificate may be renewed every three years from the date of completion by successfully completing a subsequent mature driver improvement course.

(g) For the purposes of this section, and Sections 1676 and 1677, “course provider” means any person offering a mature driver improvement course approved by the department pursuant to subdivision (a) of this section.

SEC. 4. Section 1676 is added to the Vehicle Code, to read:

1676. (a) An individual enrolling in a mature driver improvement course pursuant to Section 1675, shall pay to the course provider, a fee not to exceed twenty dollars (\$20).

(b) Each course provider shall issue a receipt for any fee it collects from any individual who registers for or attends a mature driver improvement course.

(c) The department shall charge a fee not to exceed three dollars (\$3) for each completion certificate issued by a mature driver improvement course provider, pursuant to subdivision (d) of Section 1675. The amount of the fee shall be determined by the department and shall be sufficient to defray the actual costs incurred by the department for administering the mature driver improvement program, for evaluating the program, and for any other activities deemed necessary by the department to assure high quality education for participants of the program. A course provider shall not charge a fee in excess of the fee charged by the department pursuant to this subdivision for furnishing a certificate of completion or duplicate thereof. The department shall transmit all fees it receives for deposit in the Motor Vehicle Account in the State Transportation Fund pursuant to Section 42270.

SEC. 5. Section 1677 is added to the Vehicle Code, to read:

1677. (a) The department may collect a fee, to be determined by the department, from each course provider who shall be responsible for the development and operation of a mature driver improvement course, for the approval of the course, but not to exceed the actual cost of approval of the course. The department shall transmit all fees it receives for deposit in the Motor Vehicle Account in the State Transportation Fund pursuant to Section 42270.

(b) Each course provider, who has received course approval from the department, is responsible for the delivery, instruction, and content of his or her mature driver improvement course.

(c) The department shall investigate claims of impropriety on the part of a course provider. The department may withdraw the approval of course in violation of Section 1675 or 1676, as determined by the department, for just cause, including, but not limited to any of the following:

(1) Furnishing course completion certificates to course enrollees prior to, or in the absence of, completion of the curriculum specified in subdivisions (b) and (c) of Section 1675.

(2) Failure to report records of enrolled students and records of satisfactory course completion.

(3) Charging fees in excess of the amounts specified in subdivision (a) and subdivision (c) of Section 1676.

(d) Mature driver improvement courses approved by the department shall continue to be approved until either of the following occurs:

(1) The course provider does not meet the conditions of approval.

(2) The department finds just cause to terminate the approval pursuant to subdivision ©.

SEC. 6. Section 1678 is added to the Vehicle Code, to read:

1678. (a) The department shall produce a set of statistical tabulations of the accident rates of graduates and nonparticipants in mature driver improvement courses. The tabulations shall include, but are not limited to, all of the following:

Differences, if any, between the cumulative driving records of mature driver improvement course graduates and the driving records of other drivers with similar characteristics who have not taken the course.

Factors that may influence course participation.

The department shall report its findings, and make recommendations, to the Legislature not later than July 1 of each year, beginning with July 1, 1989.

SEC. 7. No reimbursement is required by this act pursuant to Section 6 of Article XIII B of the California Constitution because the only costs which may be incurred by a local agency or school district will be incurred because this act creates a new crime or infraction, changes the definition of a crime or infraction, changes the penalty for a crime or infraction, or eliminates a crime or infraction.

SEC. 8. Sections 1 to 7 of this act shall become operative on July 1, 1987.

APPENDIX B

Descriptions of Criterion Measures and Variables Considered for Inclusion as Covariates in Statistical Models

Type/name	Description
<u>Criterion measures</u>	
Pos18fin	Number of 18-month subsequent-to-reference-date fatal/injury crashes
Pos18cit	Number of 18-month subsequent-to-reference-date total citations
<u>Demographic covariates</u>	
Sex	Sex of participant
Age	Age of participant at time of reference date
Class	License class of participant (commercial or non-commercial)
<u>Prior driver record covariates</u>	
Pre5fin	Number of 5-month prior-to-reference-date fatal/injury crashes
Pre5cit	Number of 5-month prior-to-reference-date total citations
Pre5acc	Number of 5-month prior-to-reference-date total crashes
<u>Aggregate census covariates</u>	
Urban	Percent urban in participant's ZIP code
Black	Percent black in participant's ZIP code
Mean age	Mean age in participant's ZIP code
Married	Percent married of all adults in participant's ZIP code
H School	Percent with high school degree of all adults in participant's ZIP code
College	Percent with college degree of all adults in participant's ZIP code
Social	Percent receiving social security in participant's ZIP code
Unemployed	Percent unemployed in participant's ZIP code
Age 55&up	Percent age 55 and up in participant's ZIP code
Incomef	Median family income in participant's ZIP code
Incomeh	Median household income in participant's ZIP code
House	Median house value in participant's ZIP code
White	Percent white in participant's ZIP code
Hisp	Percent hispanic in participant's ZIP code
Assist	Percent receiving public assistance in participant's ZIP code
Rent	Percent renting in participant's ZIP code
<u>Aggregate driving-locality covariates</u>	
Avinjacc	Average number of injury crashes per driver in participant's ZIP code
Avallacc	Average number of total crashes per driver in participant's ZIP code
Avmajcon	Average number of major convictions per driver in participant's ZIP code
Avmoviol	Average number of moving violations per driver in participant's ZIP code
Avallcon	Average number of total convictions per driver in participant's ZIP code
Avfatacc	Average number of fatal crashes per driver in participant's ZIP code

APPENDIX C

Analysis of Covariance Linear Equation Models

Table C-1

Unstandardized 18-Month Subsequent Fatal/Injury Crashes Analysis of Covariance Linear Equation Model Intercepts, Covariate Regression Coefficients (β), and Standard Errors of Regression Coefficients (SE) for Home-Study MDI and Comparison Drivers

Group	Intercep t	Covariates							
		Sex	Refage*	Class	Pre5con	Pre5acc	Pre5fin	College	Avinjacc
<u>MDI</u>									
β	-0.005	-0.004	-0.000	0.014	0.017	0.020	-0.022	0.007	1.303
SE		0.000	0.000	0.004	0.003	0.004	0.008	0.004	0.165
<u>Control</u>									
β	-0.003	-0.004	-0.000	0.014	0.017	0.020	-0.022	0.007	1.303
SE		0.000	0.000	0.004	0.003	0.004	0.008	0.004	0.165

Note. All variables included in the linear model are statistically significant ($p < .05$).

* Heterogeneous regression coefficients.

Table C-2

Unstandardized 18-Month Subsequent Total Citations Analysis of Covariance Linear Equation Model Intercepts, Covariate Regression Coefficients (β), and Standard Errors of Regression Coefficients (SE) for Home-Study MDI and Comparison Drivers

Group	Intercept	Covariates							
		Sex*	Refage*	Class	Pre5con*	Pre5acc	Avinjacc	Avallacc	Avallcon
<u>MDI</u>									
β	0.262	-0.070	-0.002	0.167	0.053	0.057	-3.894	1.052	0.345
SE		0.018	0.001	0.011	0.061	0.010	0.558	0.169	0.040
<u>Control</u>									
β	0.343	-0.064	-0.003	0.167	0.143	0.057	-3.894	1.052	0.345
SE		0.003	0.000	0.011	0.007	0.010	0.558	0.169	0.040

Note. All variables included in the linear model are statistically significant ($p < .05$).

* Heterogeneous regression coefficients.

Table C-3

Unstandardized 18-Month Subsequent Fatal/Injury Crashes Analysis of Covariance Linear Equation Model Intercepts, Covariate Regression Coefficients (β), and Standard Errors of Regression Coefficients (SE) for In-Person MDI and Comparison Drivers

Group	Intercept	Covariates				
		Sex	Refage*	Pre5con	Pre5acc	Avfatacc
<u>MDI</u>						
β	0.005	-0.005	0.000	0.011	0.005	0.071
SE		0.001	0.000	0.002	0.003	0.023
<u>Control</u>						
β	0.020	-0.005	-0.000	0.011	0.005	0.071
SE		0.001	0.000	0.002	0.003	0.023

Note. All variables included in linear model are statistically significant ($p < .05$).

* Heterogeneous regression coefficients.

Table C-4

Unstandardized 18-Month Subsequent Total Citations Analysis of Covariance Linear Equation Model Intercepts, Covariate Regression Coefficients (β), and Standard Errors of Regression Coefficients (SE) for In-Person MDI and Comparison Drivers

Group	Intercept	Covariates						
		Sex*	Refage*	Class*	Pre5con*	Pre5acc	College	Avallcon*
<u>MDI</u>								
β	0.197	-0.039	-0.002	0.067	0.067	0.050	0.071	0.229
SE		0.002	0.000	0.026	0.009	0.007	0.007	0.047
<u>Control</u>								
β	0.330	-0.064	-0.004	0.146	0.144	0.050	0.071	0.357
SE		0.003	0.000	0.010	0.007	0.007	0.007	0.032

Note. All variables included in the linear model are statistically significant ($p < .05$.)

* Heterogeneous regression coefficients.